information networks, such as the internet, and more particularly to such information systems especially adapted for operation in portal and other web sites wherein a search engine operates with collaborative and content-based filtering to provide better search responses to user queries.

In the operation of the internet, a countless number of informons are available for downloading from any of at least thousands of sites for consideration by a user at the user's location. A user typically connects to a portal or other web site having a search capability, and thereafter enters a particular query, i.e., a request for informons relevant to a topic, a field of interest, etc. Thereafter, the search site typically employs a "spider" scanning system and a content-based filter in a search engine to search the internet and find informons which match the query. This process is basically a pre-search process in which matching informons are found, at the time of initiating a search for the user's query, by comparing informons in an "informon data base" to the user's query. In essence, the pre-search process is a short term search for quickly finding and quickly identifying information entities which are content matched to the user's query.

The return list of matching informons can be very extensive according to the subject of the query and the breadth of the query. More specific queries typically result in shorter return lists. In some cases, the search site may also be structured to find web sites which probably have stored informons matching the entered query.

Collaborative data can be made available to assist in informon rating when a user actually downloads an informon, considers and evaluates it, and returns data to the search site as a representation of the value of the considered informon to the user.

In the patent application which is parent to this continuation-in-part application, i.e. Serial Number 08/627,436, filed by the present inventors on April 4, 1996, now US Patent # 5,867,799 and hereby incorporated by reference, an advanced collaborative/content-based information filter system is employed to provide superior filtering in the process of finding and rating informons which match a user's query. The information filter structure in this system integrates content-based filtering and collaborative filtering to determine relevancy of informons received from various sites in the internet or other network. In operation, a user enters a query and a corresponding "wire" is established, i.e., the query is profiled in storage on a content basis and adaptively updated over time, and informons obtained from the network are compared to the profile for relevancy and

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ranking. A continuously operating "spider" scans the network to find informons which are received and processed to determine relevancy to the individual user's wire or to wires established by numerous other users.

The integrated filter system compares received informons to the individual user's query profile data, combined with collaborative data, and ranks, in order of value, informons found to be relevant. The system maintains the ranked informons in a stored list from which the individual user can select any listed informon for consideration.

B3 As the system continues to feed the individual user's "wire", the stored relevant informon list typically changes due to factors including a return of new and more relevant informons, adjustments in the user's query, feedback evaluations by the user for considered informons, and updatings in collaborative feedback data. Received informons are similarly processed for other users' wires established in the information filter system. Thus, the integrated information filter system performs continued long-term searching, i.e., it compares network informons to multiple users' queries to find matching informons for various users' wires over the course of time, whereas conventional search engines initiate a search in response to an individual user's query and use content-based filtering to compare the query to accessed network informons typically to find matching informons during a limited, short-term search time period.

The present invention is directed to an information processing system especially adapted for use at internet portal or other web sites to make network searches for information entities relevant to user queries, with collaborative feedback data and content-based data and adaptive filter structuring, being used in filtering operations to produce significantly improved search results.

Delete pages 2-9.

Page 10, delete lines 1-8 and lines 11-29.

Page 10, after line 10, insert:

--A search engine system employs a content-based filtering system for receiving informons from a network on a continuing basis and for filtering the informons for relevancy to a wire or demand query from an individual user. A feedback system provides feedback data from other users.

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Another system controls the operation of the filtering system to filter for one of a wire response and a demand response and to return the one response to the user. The filtering system combines pertaining feedback data from the feedback system with content profile data in determining the relevancy of the informons for inclusion in at least a wire response to the query.--

Delete pages 11-14.

Page 15, delete lines 1-18.

Page 16, after line 15, insert --Figure 8 is a logic diagram illustrating a search selection feature of the invention;

Figure 9 is a functional block diagram of an embodiment of the invention in which an integrated information processing system employs a search engine and operates with combined collaborative filtering and content-based filtering, which is preferably adaptive, to develop responses to user queries.

Figure 10 shows another and presently preferred embodiment of the invention in which an information processing system includes an integrated filter structure providing collaborative/adaptive-content-based filtering to develop longer term, continuing responses to user queries, and a search engine structure which provides short term, demand responses to user queries, with the system directing user queries to the appropriate structure for responses.--

Page 16, line 18 delete "provides", and insert --is preferably configured with--.

Page 16, line 23, delete "invention", and insert --information filtering is long term in the sense that it operates on a continuing basis, and--.

Page 17, line 1, delete "invention", and insert --filter--.

Page 17, line 6, after "method.", delete the rest of the line.

Page 17, delete lines 7 and 8.

Page 17, line 16, delete ", for example,".

Page 20, line 4, delete "invention employs", and insert --system apparatus includes a filter structure having--, and delete "content", and insert --content-based--.

Page 20, line 7, before "The", insert --As used herein, the term "content-based filter" means a filter in which content data, such as key words, is used in performing the filtering process. In a collaborative filter, other user data is used in performing the filtering process. A collaborative

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filter is also sometimes referred to as a "content" filter since it ultimately performs the task of finding an object or document having content relevant to the content desired by a user. If there are some instances herein where the term "content filter" is used as distinguished from a collaborative filter, it is intended that the term "content filter" mean "content-based filter."--

Page 20, line 24, delete "invention", and insert --filter structure--.

Page 21, line 5, delete "can be provided".

Page 21, line 7, delete "profile", and insert --profiles--.

Page 21, line 12, after "author", insert --,--.

Page 21, line 18, delete "memclient is view", and insert --new member client is viewed--"

Page 23, line 11, delete "fora for".

Page 23, line 12, delete "obtaining".

Page 24, line 6, delete "of the invention".

Page 24, line 7, delete "the".

Page 24, line 12, delete "invention", and insert --filter structure--.

Page 24, line 12, delete ", and".

Page 24, line 13, delete "tracking shifts in,".

Page 24, line 15, before "whether", insert --and tracking shifts in the preferences--.

Page 24, line 17, delete "This" and insert --The--.

Page 25, delete lines 17-25.

Delete pages 26-32.

Page 33, delete lines 1-6.

Page 33, line 8, after "apparatus 1", insert --structured--, and delete "according to the invention herein", and insert --for search engine implementation in accordance with the invention as described subsequently herein in connection with Figures 8 and 9--.

Page 33, line 11, delete "recognized", and insert --recognize--.

Page 34, line 4, delete "have an informon", and insert --has an information--.

Page 34, line 5, delete "the", and insert --an--.

Page 34, line 5, delete "the", and insert --an--.

Page 34, line 7, after "of", insert --raw--.

Page 34, line 15, delete "the"(every occurrence), and insert --a--.

Page 34, line 21, delete "bases", and insert --based--.

Page 35, line 7, delete "35".

Page 35, line 12, delete "an", and insert --a--.

Page 35, line 22, delete "technique", and insert --techniques--.

Page 36, line 11, delete "conyent", and insert --content--.

Page 36, line 22, delete "The", and insert --A--.

Page 38, line 4, insert "(melding of agent "minds")" after --domains--.

Page 38, line 8, delete "collaborative", and insert --content--.

Page 38, line 16, delete "processor"(both occurrences), and insert --processors--.

Page 38, line 22, delete "processor", and insert --processors--.

Page 40, line 11, delete "processor", and insert --processors--.

Page 40, line 12, delete "processor", and insert --processors--.

Page 40, line 13, delete "processor", and insert --processors--.

Page 40, line 17, delete "processor", and insert --processors--.

Page 40, line 19, delete "processor", and insert --processors--.

Page 40, line 20, delete "community", and insert --communities--, and delete "a".

Page 40, line 21, delete "profile", and insert --profiles--, delete "is", and insert --are--, and delete "each of".

Page 40, line 25, delete "processor", and insert --processors--.

Page 41, line 4, delete "profiling", and insert --filtering--.

Page 41, line 6, delete "processor", and insert --processors--.

Page 41, line 7, delete "processor", and insert --processors--.

Page 41, line 17, delete "profiles".

Page 41, line 19, delete "profiles".

Page 41, line 22, delete "responsive to the member client feedback".

Page 41, line 23, delete "profiles 65a-d".

Page 42, line 8, delete "respective".

Page 42, line13, delete "Apparatus 50 also", and insert --Any of the adaptive filters 66a-d--, and

delete "as one or".

Page 42, line 14, delete "more of adaptive filter 66a-d".

Page 42, line 20, before "apparatus", insert --the--, and after "apparatus", insert --50--.

Page 42, after "additional", insert --respective--.

Page 43, line 14, delete " The invention herein also comprehends a method", and insert --The above described system operates in accordance with--.

Page 44, line 6, before "distributed", insert --machine--.

Page 44, line 7, delete "step", and insert --substep--, and delete "producing", and insert --using--.

Page 44, line 8, delete "step", and insert --substep--.

Page 44, line 9, delete "producing", and insert --using--.

Page 44, line 10, delete "at steps", and insert --in substeps--.

Page 44, line 13, delete "of".

Page 44, line 18, delete "includes", and insert --include--.

Page 44, line 23, after "the", insert --user--.

Page 44, line 25, before "feedback", insert--user--.

Page 45, line 8, delete "describes", and insert --illustrates--, and delete "embodiment of".

Page 45, line 9, delete ", according to the invention herein".

Page 45, line 13, delete "a".

Page 45, line 23, delete "the", and insert --a--.

Page 46, line 18, delete "respective", and insert --pertaining--.

Page 46, line 22, delete "employs", and insert --employ--.

Page 47, delete lines 6-7, and insert --The information filtering method shown in Figure 5--.

Page 47, line 8, delete "invention".

Page 47, line 17, delete "profiling", and insert --filtering--.

Page 47, line 23, delete "In the present invention, it", and insert --It--.

Page 48, line 13, delete "that".

Page 48, line 14, delete "can be".

Page 48, line 15, delete "assumed".

Page 48, line 19, delete "are", and insert --be--.

Page 53, line 8, delete "exceed", and insert --exceeded--.

Page 53, line 18, delete "an".

Page 57, line 16, delete "An exemplary of", and insert --As an example--.

Page 57, line 23, after "TABLE 1", insert --(following the text of this specification)--.

Page 58, line 27, delete "130", and insert --430--.

Page 59, delete line 10 through the last line.

Delete pages 60-62.

Page 68, line 7, after "However,", insert --the invention can be embodied with use of--.

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Page 68, line 8, delete "as was used earlier in the discussion of", and insert --like that previously considered in connection with--.

B12

Page 68, line 10, delete "is preferred to be able to include", and insert --preferably includes--.

Page 69, line 14, delete "a".

Page 72, line 17, after "used", insert --to--.

Page 72, line 22, delete "one', and insert --a preferred--.

Page 72, line 23, delete "heirarchy", and insert --system--.

Page 73, line 5, delete "as", and insert --As--.

Page 73, line 8, delete "Mindpools", and insert --Sub-mindpools--.

Page 73, line 9, delete "mindpools", first appearance, and insert --sub-sub-mindpools--.

Page 73, line 10, delete "502a-3. Mindpools", and insert --503a-c. Sub-sub-mindpools--.

Page 74, line 18, after "communication", insert --be provided--.

Page 75, line 25, after "down", insert --the--.

Page 75, line 14, delete "computer-", and insert --computer-guided--.

Page 75, line 19, delete "because".

Page 77, line 25, delete "is", and insert --be--.

Page 78, line 19, delete "An example of", and insert --The following exemplifies--.

Page 78, line 20, delete "is given presently.", and insert --:--.

Page 82, after line 10, beginning with a new paragraph, insert:

--The invention of this continuation-in-part application, as shown in Figures 8 and 9, provides a collaborative and preferably adaptive search engine system in which elements of the

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structure and principles of operation of the apparatus of Figures 1-7 are applied. Accordingly, a search engine system of the invention, as preferably embodied, integrates collaborative filtering with adaptive content-based filtering to provide improved search engine performance. The acronym "CASE" refers to a search engine system of the invention, i.e., a collaborative, adaptive search engine.

In the operation of conventional search engines at portal web sites, user queries are searched on demand to find relevant informons across the web. Content-based filtering is typically used in measuring the relevacy of informons, and the search results are resented in the form of a list of informons ranked by relevancy.

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The present invention combines collaborative filtering with content-based filtering in measuring informons for relevancy, and further preferably applies adaptive updating of the content-based filtering operation. In providing these results, the invention can be embodied as a search engine system in accordance with different basic structures. In the presently preferred basic structure, an integrated collaborative/content-based filter (Figures 1-7) is operated to provide ongoing or continuous searching for selected user queries, with a "wire" being established for each query. On the other hand, a regular search engine is operated to make immediate or short-term "demand" searches for other user queries on the basis of content-based filtering. This basic structure of the invention is especially beneficial for use in applying the invention to existing search engine structure.

Demand search results can be returned if no wire exists for an input query. Otherwise, wire search results are returned if a wire does exist, or collaborative ranking data can be applied from the wire filter structure to improve the results of the demand search from the regular search engine.

In the currently preferred embodiment, wires are created for the most common queries received by the search engine system. A suitable analysis is applied to the search engine operations to determine which queries are most common, and respective wires are then created for each of these queries. An analysis update can be made from time to time to make wire additions or deletions as warranted.

When a user makes a query for which a wire already exists, wire search results are

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preferably returned instead of regular search engine results. As shown in the logic diagram of Figure 7, a user provides a query as indicated by block 20C. The query is applied to a Lookup Table, as indicated by block 22C, block 24C applies a test to determine from the table whether a wire already exists for the new query. If so, block 26C returns results from the existing wire. Otherwise, block 28C commands a demand search by a regular query engine.

With the use of wire search returns, each user can review the returned results and provide feedback data about reviewed documents. Such feedback data is incorporated in the filter profiles used in processing informons for the wire. Therefore, when a future user makes substantially the same query, the wire will have been improved by the incorporation of previous users' feedback data. By analyzing documents which users rate as meeting a particular quality such as interestingness, the system can find common document features which can be used to return more like documents to future users who make substantially the same query.

Alternatively, all queries applied to a search engine system of the invention can set up new wires. After a search query is presented to the search engine system, a wire is created on the basis of the query terms, and all new documents subsequently received from the network are filtered by the new wire. A push-model may be used to send all passed, new documents to the user.

Among other basic search engine system structures, an integrated system can be employed in which collaborative and content-based filtering is structured to provide demand searches with or without collaborative filtering, or wire searches. In the operation of the preferred basic structure and other basic structures, a query processor can be employed, if needed, to make search-type assignments for user queries. Generally, basic search engine system structures of the invention are preferably embodied with the use of a programmed computer system.

Collaborative filtering employs additional data from other users to improve search results for an individual user for whom a search is being conducted. The collaborative data can be feedback informon rating data, and/or it can be content-profile data for agent mind melding which is more fully disclosed in Serial Number 09/195,703 now Pending (~~Docket # LYC 4~~), entitled INTEGRATED COLLABORATIVE/CONTENT-BASED FILTER STRUCTURE EMPLOYING SELECTIVELY SHARED, CONTENT-BASED PROFILE DATA TO EVALUATE

INFORMATION ENTITIES INA MASSIVE INFORMATION NETWORK, filed by the current inventors on November 19, 1998, and hereby incorporated by reference.

Many types of user rating information can be used. For example, users can sort documents which they have read from best to worst. Alternatively, users can select on a scale (numeric, such as 1 to 10, or worded, such as good, medium, poor) how much they enjoyed reading a document. Further, user monitoring can measure time spent by users on each document, thereby indicating user interest (normalized by document length). Among other possibilities, the choices of documents for reading by other users can be simply used as an indiction of interesting documents. In all cases, the feedback rating data can be based on interestingness or any of a variety of other document qualities, as described in connection with Figures 1-7.

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Feedback ranking information can be used in a number of ways, and the invention is not limited by the method of feedback information use. Use methods range in spectrum from weighting relative ranks by a set amount (possibly equally, possibly heavy weighting one above the other) to dynamically adjusting the weight by measuring how statistically significant the user feedback is. For example, if only one person has ranked an article, it may not be significant. However, if many people have consistently ranked an article the same, more credibility may be placed on the user's weighting.

Figure 9 shows a generalized embodiment of the invention in which system elements in a CASE system 30C are integrally configured to provide wire and/or demand searches. A query processor 32C receives queries from an individual user 34C and other users 36C. A mode selector 38C responds to the currently processed query to set a content-based filter structure 40C for wire search operation or demand search operation. In the preferred appication of the invention, the wire mode is selected only if a wire already exists, and wires exist only for those queries found to be commonly entered as previously described. In the demand search mode, the filter structure 40C can function similarly to a normal search engine.

Otherwise, various schemes can be used for determining whether a wire search or a demand search is made. For example, every query can call for a wire search, with a demand search being made the first time a particular query is entered and with wire searches being made

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for subsequent entries of the same query. As another example, the user may select a demand search, or, if continuing network searching is desired, the user may select a wire search.

The filter structure 40C operates in its set wire search mode or demand search mode, and employs content-based profiles 42C in content-based filtering (preferably multi-level as described in connection with Figures 1-7). Wire profiles 42C1 are adaptively updated with informon-evaluation, feedback data from users respectively associated therewith. These profiles are used by the filter structure 40C in wire searches in the wire mode.

Demand profiles 42C2 are used by the filter structure 40C in demand searches in the demand mode. Collaborative profile data can be integrated with the wire profiles through agent mind melding 43C as previously explained.

B13 A spider system 46C scans a network 44C to find informons for a current demand search, and to find informons with continued network scanning for existing wires. In selecting available informons for return, the spider system 46C uses a content threshold derived from the content-based profile for which an informon search is being conducted.

In many instances, it s preferable that the spider system 46C have a memory system 46CM which holds an informon data base wherein index information is stored from informons previously collected from the network. In this manner, demand searches can be quickly made from the spider memory 46CM as opposed to making a time consuming search and downloading in response to a search demand query from the search engine.

A search return processor 48C receives either demand search informons or wire search informons passed by the content-based filter structure 40C according to the operating mode of the latter, and includes an informon rating system which is like that of Figure 6. The informon rating system combines content-based filtering data with collaborative feedback rating data, from users through a feedback processor 50C at least in the wire search mode and, if desired, in the demand search mode.

In the wire search mode, the processor 48C rates informons on a continuing basis as they are received from the network 44C through the spider system 46C as indicated by the reference character 48C1. In the demand search mode, the processor 48C rates informons returned by the spider system 46C in a demand search as indicated by the reference character 48C2.

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Collaborative rating data is used in the informon rating process in the wire search mode, and if applied in the demand search mode, to the extent that collaborative data is available for the informons in the search return. Search results are returned to the users 34C and 36C from the search return processor 48C as shown in Figure 9.

The invention is preferably embodied as shown in Figure 10. A query processor 60C receives queries from an individual user 62C and other users 64C and determines whether a wire already exists for each entered query. If a wire exists, the query is routed to a collaborative/content-based filter structure 66C like that of Figures 1-7. A spider system 68C continuously scans a network 70C for informons providing a threshold-level match for content based profiles (i.e., preprocessing profiles at the top level of the preferred multi-level filter structure, at least one of which reflects the content profile of a current wire query). Informons which are passed by the filter 66C for existing wires are stored in a memory 72C according to the wire or wires to which they belong.

A feedback processor 74C is structured like the mindpool system of Figure 7 to provide collaborative feedback data for integration with the content-based data in the measurement of informon relevancy by the filter 66C. An informon rating structure like that of Figure 6 is employed for this purpose. Adaptive feedback data is applied from the users to the filter 66C as shown in order to update content profiles as previously described.

If no wire exists for a currently input query, the query is sent to a regular search engine where a content profile is established for content based filtering of informons returned by a spider system 78C in a demand search of the network 70C. The spider system 78C can have its own memory system 78CM as considered in connection with the spider 46C of Figure 9.

Once filtering is performed on returned informons, those informons which provide a satisfactory match to the query are returned as a list to the user through a search return processor 80C. The processor 80C creates a new wire for the current query for which a demand search was made, if a demand search memory 82C indicates that the current query has been made over time with sufficient frequency to qualify as a "common" query for which a wire is justified. As indicated by dashed connector line 80FD, collaborative feedback data can be, and preferably is, integrated into the demand search processing by the processor 80C.

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Page 82, delete lines 11-16.

Page 82, line 17, delete "Furthermore, many", and insert --Many--.

Delete pages 86-90.

IN THE CLAIMS:

Please cancel claims 1-84.

Please add the following claims:

85. A search engine system comprising:

a first system for receiving informons from a network on a continuing search basis, for filtering such informons for relevancy to a query from an individual user, and for storing a ranked list of relevant informons as a wire;

a second system for receiving informons from a network on a current demand search basis and for filtering such informons for relevancy to the query from the individual user; and

a third system for selecting at least one of the first and second systems to make a search for the query and to return the wire or demand search results to the individual user.

86. The system of claim 85 wherein the third system selects the first system to make a wire search only if a wire already exists for the query.

87. The system of claim 85 wherein:

a feedback system is provided for receiving collaborative feedback data from system users relative to informons considered by such users; and

at least the first system combines pertaining data from the feedback system with content profile data of the first system in filtering each informon for relevance to the query and inclusion in the wire.

88. The system of claim 87 wherein the first system includes a multi-level, content-based filter having descending levels including at least an upper preprocessing level, a middle user community level, and a bottom user level.

89. The system of claim 85 wherein adaptive user feedback data is applied at least to the first system to provide updating of content profile data employed therein.

90. A search engine system comprising:

a system for scanning a network to make a demand search for informons relevant to a

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